

FIG. 1

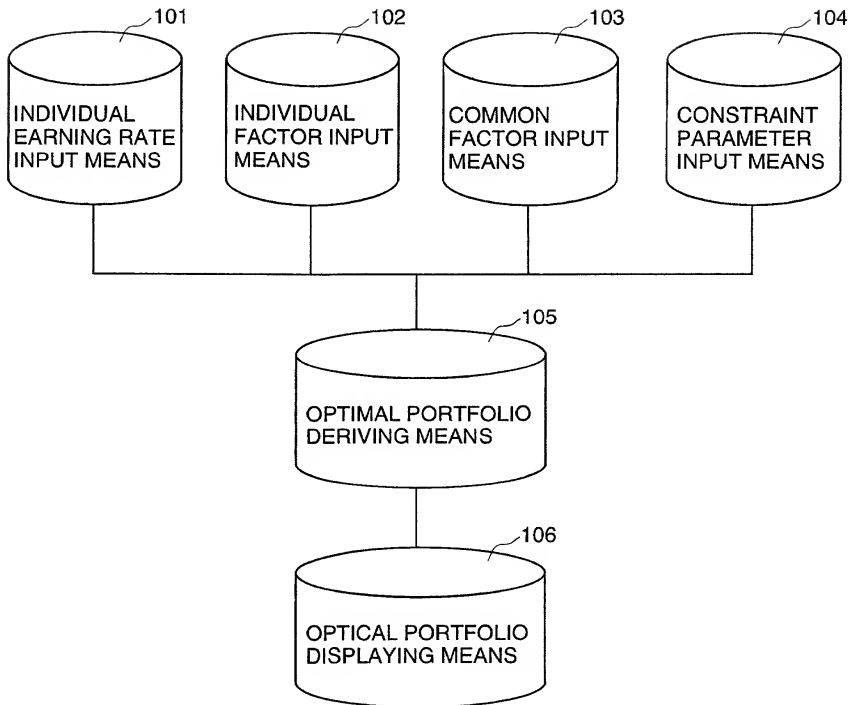


FIG. 2

	EXPECTED EARNING RATE
NAME 1	0.7194
NAME 2	0.6173
NAME 3	1.0929
NAME 4	2.3438
NAME 5	-1.4706
NAME 6	0
NAME 7	0.7194
NAME 8	-1.6077
NAME 9	0
NAME 10	3.8462
:	:
:	:
:	:
NAME 1432	0.2538

FIG. 3

	EXPECTED EARNING RATE	EXPECTED EARNING RATE	BUSINESS CATEGORY CODE
NAME 1	31.4052	0.0000392	1
NAME 2	31.2757	0.0000663	1
NAME 3	34.0792	0.0001277	1
NAME 4	40.4041	0.0000972	1
NAME 5	41.9739	0.0000099	1
NAME 6	48.0905	0.0000086	1
NAME 7	26.485	0.0002644	1
NAME 8	37.9287	0.0001594	1
NAME 9	46.0203	0.0000376	2
NAME 10	34.8058	0.00004	2
:	:	:	:
:	:	:	:
:	:	:	:
NAME 1432	67.4541	0.0001751	29

FIG. 4

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	.....	FACTOR 13
FACTOR 1	11.1248	-2.3964	0.9343	1.06303	.....	0.45002
FACTOR 2	-2.3964	29.0085	0.36332	-2.9145	.....	-10.229
FACTOR 3	0.9343	0.36332	4.59532	-0.4776	.....	2.16089
FACTOR 4	1.06303	-2.9145	-0.4776	7.33842	.....	5.24325
FACTOR 5	1.2412	-18.82	1.77274	2.35877	.....	-6.4554
FACTOR 6	0.06092	-1.2146	-1.341	-1.4092	.....	-1.7343
FACTOR 7	0.66805	1.11355	0.24439	2.47768	.....	0.42619
FACTOR 8	1.32408	-0.5646	0.07054	0.67178	.....	-0.7963
FACTOR 9	0.21797	0.25349	0.10934	0.2885	.....	-0.6543
FACTOR 10	0.20325	-2.2026	-0.2885	2.91562	.....	3.28909
FACTOR 11	-0.6936	1.94818	0.55252	-0.0362	.....	0.77317
FACTOR 12	0.72795	0.34404	1.37416	0.78549	.....	-0.1364
FACTOR 13	0.45002	-10.229	2.16089	5.27069	.....	75.6235

FIG. 5

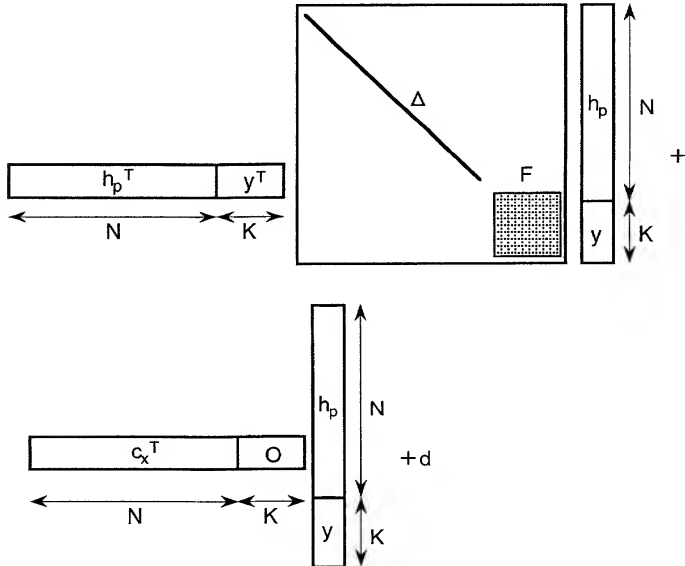
	FACTOR 1	FACTOR 2	FACTOR 3	.....	FACTOR 13
NAME 1	-1.2079	-2.55481	1.911955	.....	1.628134
NAME 2	-0.99	-1.84682	2.581261	.....	0.466797
NAME 3	1.30356	-1.72684	2.661661	.....	1.676943
NAME 4	0.076017	-1.78249	1.972969	.....	0.005749
NAME 5	-0.79037	-2.42233	1.970481	.....	0.016373
NAME 6	-1.34568	-3.22172	0.285957	.....	0.172875
NAME 7	-1.90325	-1.1879	0.359862	.....	0.5086
NAME 8	-1.07255	-2.16049	1.421758	.....	0.572681
NAME 9	1.20663	-2.04286	2.44527	.....	0.938943
NAME 10	-0.09642	-2.19015	-0.56786	.....	0.986837
:	:	:	:		:
:	:	:	:		:
:	:	:	:		:
NAME 1432	-1.20953	-1.54978	1.222617	.....	0.845859

FIG. 6

BUSINESS CATEGORY CODE	NAME	HIGH TECHNOLOGY
1	HIGH TECHNOLOGY	0.3
2	BANKING	0.25
3	BASIC MATERIAL MARKET CONDITION	0.2
4	CONSUMER ASSOCIATED	0.1
5	OTHER	0.15

FIG. 7

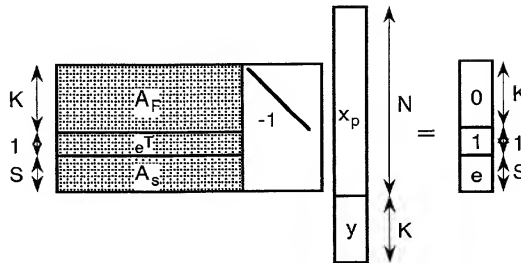
MINIMIZATION: $x^T Q x / 2 + c^T x + d$



SECONDARY COEFFICIENT MATRIX : $Q = 2 * \lambda * (\Delta + F)$
 PRIMARY COEFFICIENT VECTOR : $c_x = -\alpha - 2 * \lambda * h_m^T G$
 CONSTANT TERM : $Q = \lambda * h_m^T G h_m$

N : NUMBER OF INDIVIDUAL NAME
 K : NUMBER OF COMMON FACTOR

FIG. 8

(1) CONSTRAINT EXPRESSION : $Ax=b$ 

FACTOR EXPOSURE RELATED CONSTRAINT

$$: A_F h_p - y = 0$$

CONSTRAINT ASSOCIATED WITH SUM OF INVESTMENT RATIO

$$: e^T h_p = 1$$

CONSTRAINT ASSOCIATED WITH INVESTMENT RATIO OF
BUSINESS CATEGORY SECTOR

$$: A_S h_p = e$$

(2) NON-NEGATIVE CONSTRAINT : $x \geq 0$ INVESTMENT RATIO OF INDIVIDUAL NAME : $h_p \geq 0$ FACTOR EXPOSURE RELATED PARAMETER y :

NO NON-NEGATIVE CONSTRAINT

→APPLICATION TO INTERIOR METHOD IN PRESENT FORM IS IMPOSSIBLE

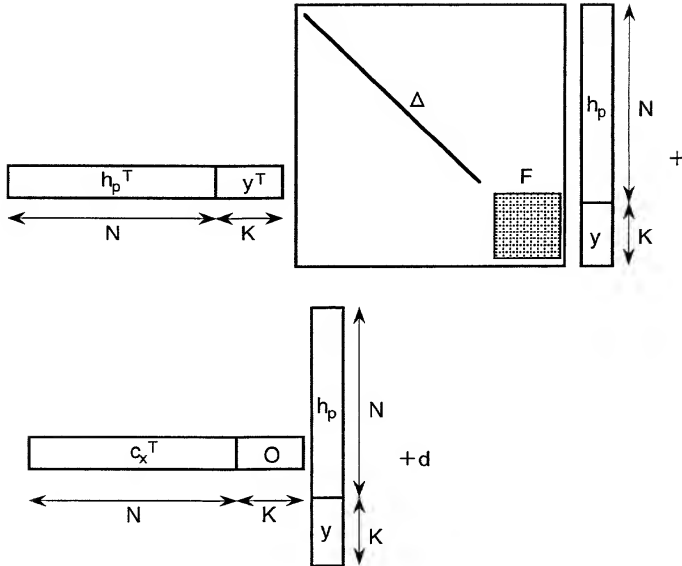
N : NUMBER OF INDIVIDUAL NAME

K : NUMBER OF COMMON FACTOR

S : NUMBER OF BUSINESS CATEGORY SECTOR

FIG. 9

MINIMIZATION: $x^T Q x / 2 + c^T x + d$



SECONDARY COEFFICIENT MATRIX : $Q = 2 * \lambda * (\Delta + F)$

PRIMARY COEFFICIENT VECTOR : $c_x = -\alpha - 2 * \lambda * x_m^T \Delta$

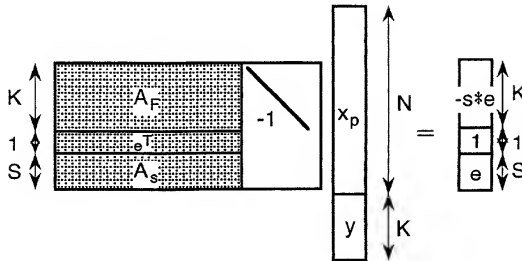
$c_y = -2 * s * e^T F$

CONSTANT TERM

: $Q = \lambda * (h_m^T G h_m + s^2 e^T G e)$

N : NUMBER OF INDIVIDUAL NAME

K : NUMBER OF COMMON FACTOR

FIG. 10(1) CONSTRAINT EXPRESSION : $Ax=b$ 

FACTOR EXPOSURE RELATED CONSTRAINT
 CONSTRAINT ASSOCIATED WITH SUM OF INVESTMENT RATIO
 CONSTRAINT ASSOCIATED WITH INVESTMENT RATIO OF
 BUSINESS CATEGORY SECTOR

: $A_F h_p - Y = -s * e$
 : $e^T h_p = 1$
 : $A_S h_p = e$

(2) NON-NEGATIVE CONSTRAINT : $x \geq 0$

INVESTMENT RATIO OF INDIVIDUAL NAME : $h_p \geq 0$
 PARAMETER AFTER CONVERSION Y : FOR SUFFICIENTLY LARGE
 POSITIVE NUMBER s $Y \geq 0$
 → INTERIOR METHOD IS APPLICABLE

N : NUMBER OF INDIVIDUAL NAME
 K : NUMBER OF COMMON FACTOR
 S : NUMBER OF BUSINESS CATEGORY SECTOR

FIG. 11

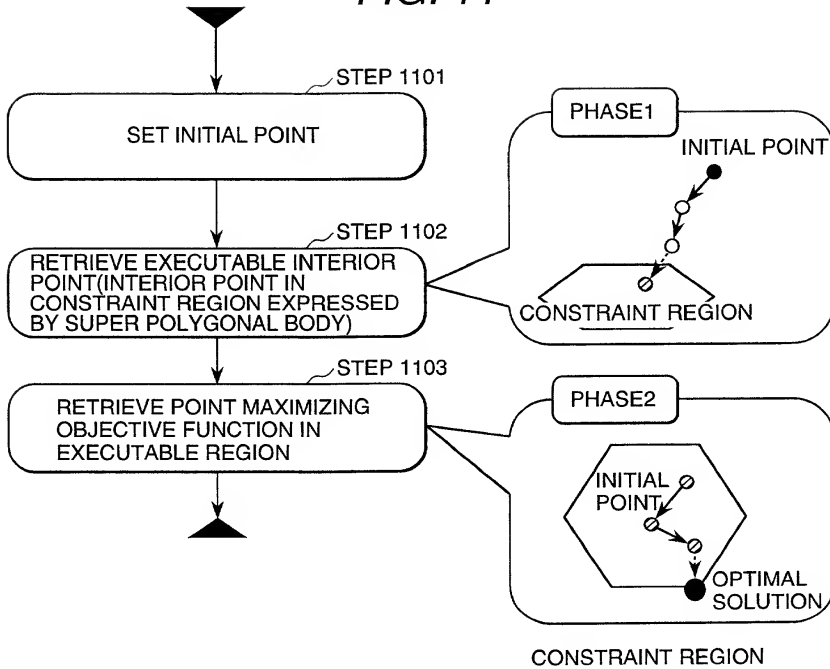


FIG. 13

〈 CALCULATION METHOD OF RIGHT SIDE VECTOR
 $b - Ax_K$ OF MEWTON'S EQUATION (15) 〉

$$\begin{bmatrix} -s^*e \\ 1 \\ e \end{bmatrix} \begin{matrix} K \\ -1 \\ S \end{matrix} \begin{bmatrix} A_F \\ e^T \\ A_S \end{bmatrix} \begin{matrix} h_p \\ y \end{matrix} \begin{matrix} N \\ K \end{matrix} = \begin{pmatrix} -s^*e - A_F h_p + y \\ 1 - e^T h_p \\ e - A_S h_p \end{pmatrix} \begin{matrix} K \\ 1 \\ S \end{matrix}$$

FIG. 12

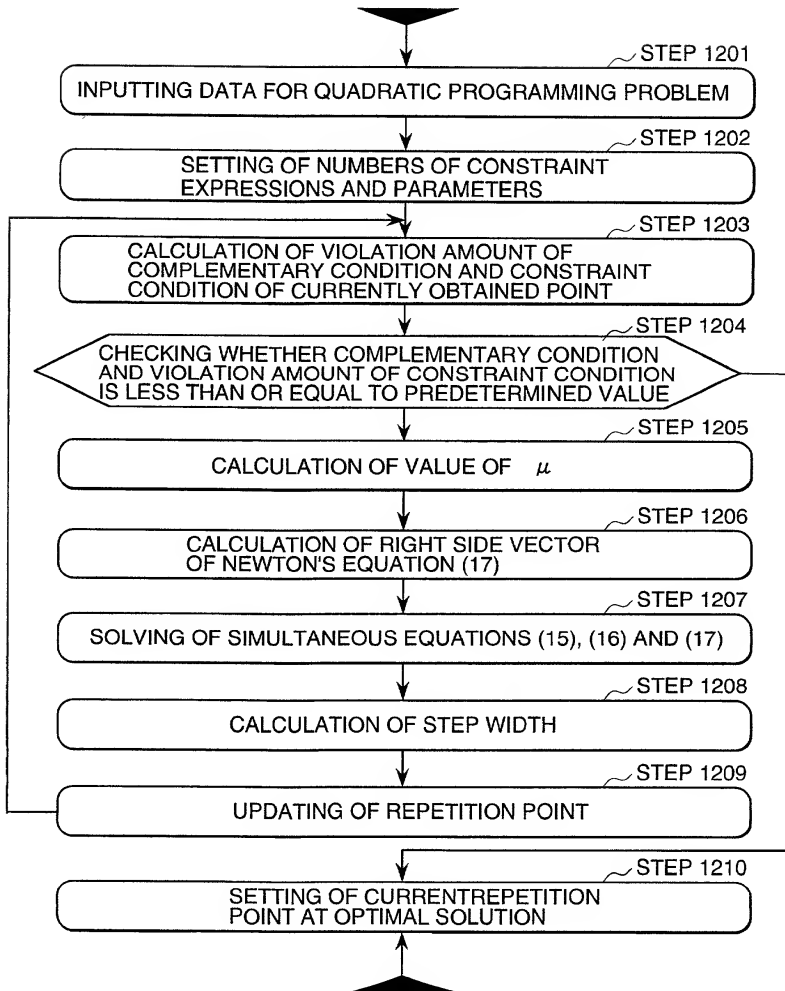
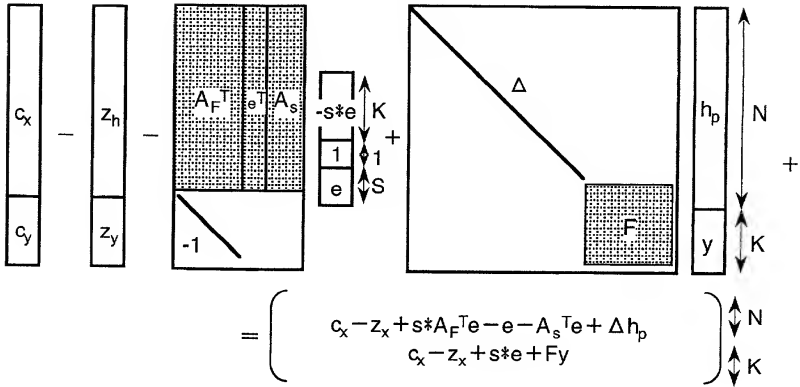
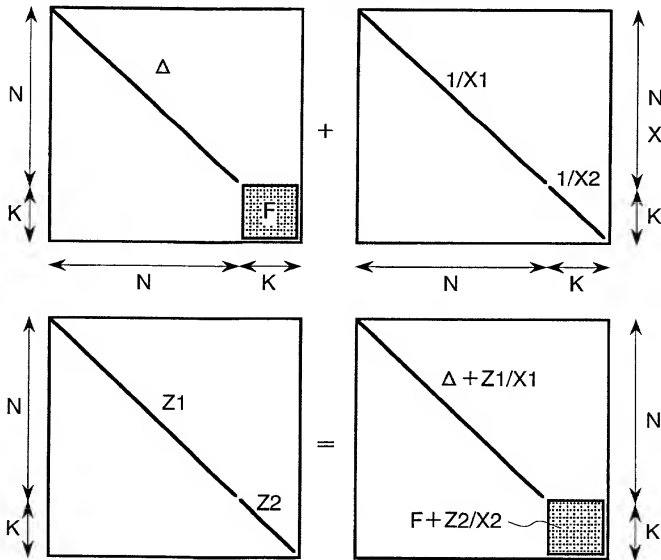


FIG. 14

〈CALCULATION METHOD OF RIGHT SIDE VECTOR
 $C - z_k - A^T y_k + Qx_k$ OF MEWTON'S EQUATION (16)〉

**FIG. 15**

〈MATRIX STRUCTURE OF $Q + X \cdot Z$ 〉



X1 : DIAGONAL MATRIX FORMED WITH ELEMENT OF N-DIMENSION VECTOR x_1
 X2 : DIAGONAL MATRIX FORMED WITH ELEMENT OF N-DIMENSION VECTOR x_2
 Z1 : DIAGONAL MATRIX FORMED WITH ELEMENT OF N-DIMENSION VECTOR z_1
 Z2 : DIAGONAL MATRIX FORMED WITH ELEMENT OF N-DIMENSION VECTOR z_2

FIG. 16

〈CALCULATION 1 OF NEWTON'S EQUATION (18) 〉

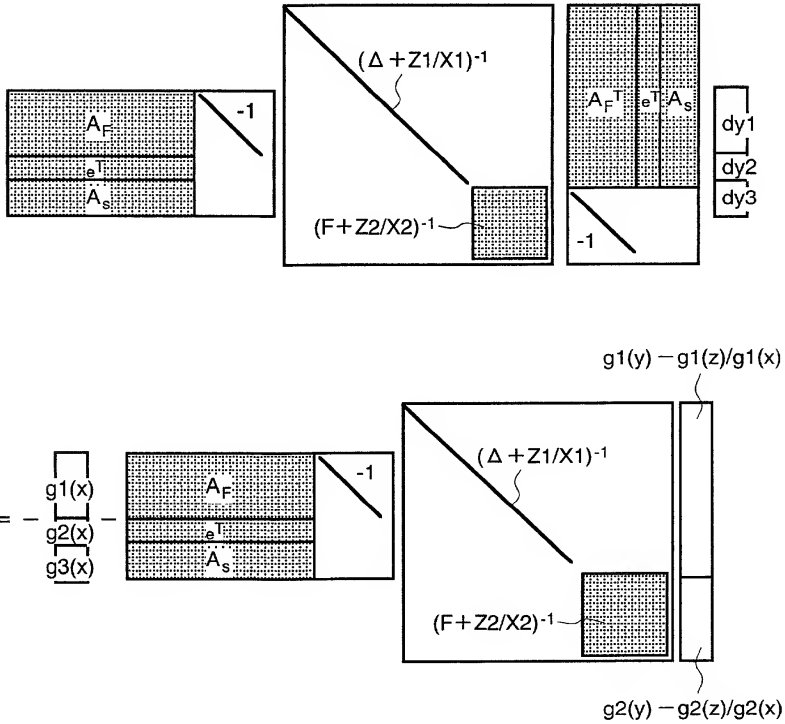
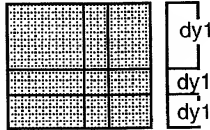


FIG. 18

(CALCULATION 3 OF NEWTON'S EQUATION (18))



$$\begin{pmatrix} A_F(\Delta + Z1/X1)^{-1}A_F^T + (F+Z2/X2)^{-1}(\delta + z1/x1)^{-T}A_F^T & A_F(\Delta + Z1/X1)^{-1}A_s^T \\ A_F(\delta + z1/x1)^{-1} & (\delta + z1/x1)^{-T}e & (\delta + z1/x1)^{-T}A_s^T \\ A_s(\Delta + Z1/X1)^{-1}A_F^T & A_s(\delta + Z1/X1)^{-1} & A_s(\Delta + Z1/X1)^{-1}A_s^T \end{pmatrix}$$

$$= \begin{pmatrix} -g1(x) - A_F(\Delta + Z1/X1)^{-1}\{g1(y) - g1(z)/g1(x)\} \\ -(F+Z2/X2)^{-1}\{g2(y) - g2(z)/g2(x)\} \\ -g2(x) - (\delta + z1/x1)^{-T}\{g1(y) - g1(z)/g1(x)\} \\ -g3(x) - A_s(\Delta + z1/x1)^{-1}\{g1(y) - g1(z)/g1(x)\} \end{pmatrix}$$

FIG. 19

NAME No	BUSINESS CATEGORY CODE	BUSINESS CATEGORY SECTOR	INVEST-MENT RATIO	SPECIFIC RISK	BENCH MARK RATIO	EXPECTED EARNING RATE [%]
1	2	3	0	31.48641	9.33E-05	0.8551
2	2	3	0	34.71193	0.000171	1.71835
3	2	3	0	40.61192	0.000167	0.4366
4	2	3	0	42.21049	7.96E-05	-0.7353
5	3	3	0	48.86621	9.23E-05	0.3597
6	3	3	0	26.89803	0.000298	-0.44415
:	:	:	:	:	:	:
:	:	:	:	:	:	:
:	:	:	:	:	:	:
40	5	4	0	35.7405	5.77E-05	3.8961
41	5	4	2.175	43.8456	0.0002	12.0823
42	5	4	0	56.8522	1.47E-05	3.7037
:	:	:	:	:	:	:
:	:	:	:	:	:	:
:	:	:	:	:	:	:
1432	25	3	0	87.4541	0.000175	0.2538

FIG. 20

NAME No	BUSINESS CATEGORY CODE	BUSINESS CATEGORY SECTOR	INVEST- MENT RATIO	SPECIFIC RISK	BENCH MARK RATIO	EXPECTED EARNING RATE [%]
41	5	4	2.175	44.81654	0.093241	12.91357
97	5	4	1.438051	49.50075	0.563199	11.91868
129	5	4	0.705988	32.77211	0.695341	9.521307
139	4	3	0.835106	53.1804	0.99132	7.39348
144	4	3	1.557042	23.78654	0.411831	4.983816
199	4	3	0.942459	45.63425	0.019441	3.457439
200	3	2	2.571606	46.83017	0.642707	13.3842
222	3	2	2.334634	37.6435	0.098	7.645901
234	3	2	2.935481	42.89463	0.347974	13.70963
301	10	2	2.041537	40.40644	0.432687	10.45938
:	:	:	:	:	:	:
:	:	:	:	:	:	:
:	:	:	:	:	:	:
1429	25	3	1.511036	92.07676	0.522114	3.447204

FIG. 21

NAME No	BUSINESS CATEGORY CODE	BUSINESS CATEGORY SECTOR	INVEST- MENT RATIO
41	5	4	2.175
97	5	4	1.438051
129	5	4	0.705988
139	4	3	0.835106
144	4	3	1.557042
199	4	3	0.942459
200	3	2	2.571606
222	3	2	2.334634
234	3	2	2.935481
301	10	2	2.041537
:	:	:	:
:	:	:	:
:	:	:	:
1429	25	3	1.511036

FIG. 22